INNOVATIVE TRACTION SOLUTIONS FOR LOCOS

TURBO POWER SYSTEMS
Powering Intelligent Solutions

National Railway Equipment Company (NREC)

Traction Power Solutions for Switcher/Shunter Locomotives

Conventional Locomotives had one diesel engine feeding into a generator and rectifier that controlled four traction DC Motors together. This large diesel engine was not fuel efficient and the locomotive lacked individual control of motors for better traction.

The solution proposed for the locomotive had three variable speed diesel engines coupled to three AC generators, these in turn are connected to three uncontrolled three phase rectifiers. The outputs of the rectifiers are connected to form a common DC bus for the Chopper drives. During periods of low traction effort only one of the diesel engines will be running and as more speed is demanded and more traction effort is required, the second and third diesel engines will address these increased demands. The diesel engines operate with a variable speed output, consequently the generators will also vary both in terms of frequency and voltage, thereby providing a variable DC voltage source for the chopper drives. From the DC bus there are four chopper drives providing controlled power to four DC series wound traction motors rated at 350kW each. TPS scope involved design and supply of Rectifier and Chopper Drive for Traction, and LVPS and Inverter Units for battery charging and HVACs. TPS has capability to execute the entire project on a turnkey basis by partnering with OEMs and can develop the control topology.

Rectifier

Chopper

LVPS

Inverter

Key Technical Features

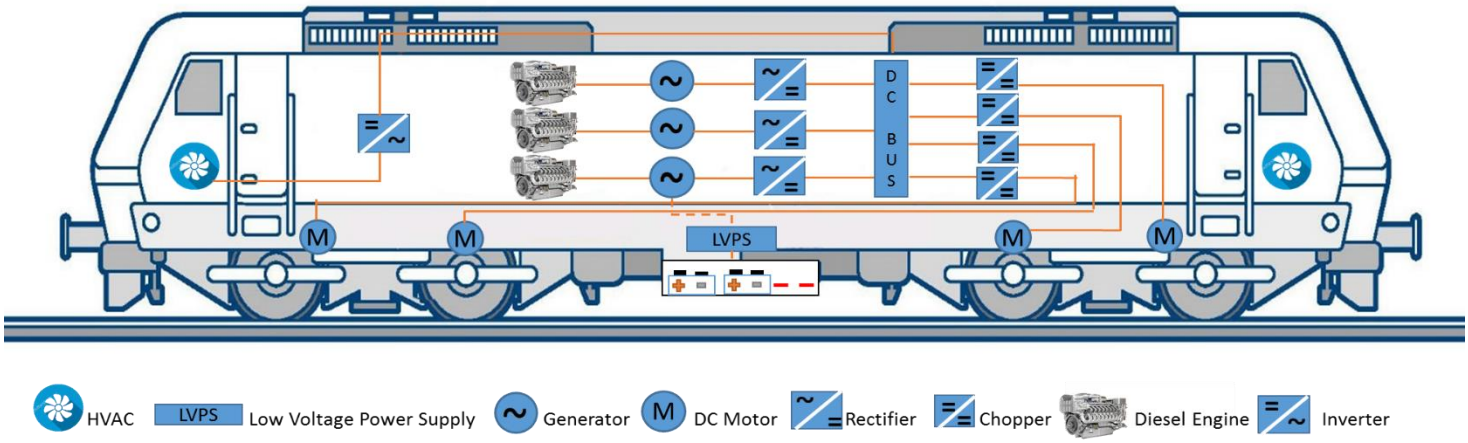
The equipment comprises of the following:

- ✓ 3 x Rectifier Modules one for each Generator
- ✓ 4 x DC Chopper Modules with filter capacitors and IGBTs connected to a common DC Bus
- ✓ 1 x LVPS Unit for battery charging (vehicle/engine start battery)
- ✓ 1 Inverter supplying power for 2 x HVAC units for cab cooling
- ✓ Protection features short circuit, overload and over temperature

Key Benefits to Operators and Owners

- ✓ Compact, lightweight solution
- ✓ Forced cooled design for better thermal performance
- ✓ Highly efficient units i.e. >90% system wide.
- ✓ Designed to match life of locomotive i.e. 25 Yrs.
- ✓ Reliable operation under extreme weather i.e. ambient of – 40^0C to +55^0C
- ✓ Silent in operation i.e < 60 dBA at 5m
- ✓ Diagnostic suite for event monitoring and fault finding

Performance Parameter	Rectifier Module	Chopper Drive	LVPS Unit	Inverter Unit
Input Voltage Range	120 Vac ± 10% 30Hz to 240 Vac ± 10% 60Hz	150Vdc ± 10% with one generator at 900rpm to 1000Vdc ± 10% with three generators at 1800rpm	3Ø 160V 40Hz to 240V 60Hz	52Vdc to 80Vdc (nominal at 74Vdc)
Output Voltage	n/a	1000Vdc at high speed (max voltage)	Output 1: 74Vdc ± 1V Output 2: 27Vdc ± 1V	115Vac rms 60Hz ± 5%
Maximum Output Current	2000Adc at 240 Vac	1450Adc (nominal at 1050Adc)	Output 1: 145A Output 2: 92A	32A
Rated Power	n/a	n/a	Output 1: 12kW Output 2: 2.5kW	3.6kVA
Isolation	n/a	n/a	2.5 kV AC rms 60 Hz between input and output for 1 min.	n/a
Protection	Electronic short-circuit, overload and temperature	Electronic short-circuit, overload and temperature	Reverse battery, electronic over voltage and over current	Reverse battery, temperature, electronic over voltage and over current
Efficiency	n/a	96.5% @ full load	90 % @ full load	>85% @ full load
Weight	n/a	50kg	90kg	85kg
Dimensions	350mm (H) x 650mm (W) x 318mm (D)	500mm (H) x 500mm (W) x 433mm (D)	500mm (H) x 500mm (W) x 433mm (D)	500mm (H) x 500mm (W) x 433mm (D)
Ambient temperature and relative humidity	-40^0 C to +50^0 C and humidity at max 100%	-40^0 C to +40^0 C humidity at max 100%	-40^0 C to +50^0 C humidity at max 100%	-40^0 C to +55^0 C humidity at max 100%
Cooling	Forced air cooled	Forced air cooled	Forced air cooled	Naturally air cooled
Portable Test Equipment (PTE)	n/a	n/a	Fault Finding Possible via RS232	Fault Finding Possible via RS232



TPS was chosen for this project due to its long standing pedigree of delivering high quality power conversion solutions for the North American market. Some of our prestigious projects include power conversion solutions for Montreal Metro, JFK Airport Express, MARTA – Metro Atlanta, Toronto Transit Commission – T1, S1, H6 fleet and Toronto Rocket.

We will be happy to discuss your project or enquiries, please contact our marketing department at marketing@turbopowersystems.com to get in touch or ring us on +44 (0) 191 482 9288/9251/9278.

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